

## DETERMINING A MINIMUM SIZE OF PRESENTATION DATA

## BACKGROUND OF THE INVENTION

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## Field of the Invention

This invention relates to computer-related presentation tools, and more specifically, to a system, method and  
10 program for determining a minimum desirable size for presentation data utilized in a presentation that is to be projected and viewed by persons within a known viewing distance.

## Description of the Related Art

15 To convey information at business meetings, conferences, and in educational settings, presentations are often made by projecting transparencies on a screen or by using an LCD projector that takes the presentation from a computer and projects the presentation onto the projection  
20 screen. Unfortunately, many times the text in the projected presentation is not readable by members of the viewing audience because it is too small. The audience is left with a deficient experience of the presentation.

Presentation tools are known in the art such as Lotus  
25 FreeLance and Microsoft Powerpoint. However, none of the known presentation tools determines when a given size of

presentation text may be too small to be viewable by viewers in a room of a given size when the presentation is projected onto a screen. The tools likewise do not warn the creator of the presentation that the current text size is too small,  
5 nor do the tools suggest a more desirable font size.

#### SUMMARY OF THE INVENTION

10 It is therefore an object of the invention to enable a presentation authoring tool to warn a user, while the user is authoring the presentation, that text may be too small to be viewable when the presentation is projected onto a viewing screen of a given size and viewed by an audience a  
15 given distance from the projection screen.

It is a further object of the invention to enable a presentation authoring tool to recommend a font size for text that will be projected onto a viewing screen of a given  
20 size at a given distance from an audience.

It is a further object of the invention to enable a presentation authoring tool to display, on a display screen utilized by a user of the authoring tool, the authored  
25 presentation in a font size that is representative of the size of text that will be viewed when projected onto a screen of a given size and viewed by an audience a given distance from the projection screen.

The system, method and program of the invention enables a presentation authoring tool, that is used to create presentation data for later projection, to determine a recommended font size for the created presentation data

5 displayed on a display screen of a computer executing the presentation authoring tool. The user interface presents a display screen for receiving input of an expected viewing distance or room size for the later projection of the presentation. The recommended font size is determined based  
10 upon the expected viewing distance of the later projection viewable by a person, having a certain viewing capability, at the expected viewing distance. The expected viewing distance may be a maximum viewing distance or a room depth of a room in which the later projection takes place. The  
15 recommended font size is further based upon a size in height of the later projection, a height of the display screen, and a font height for characters on a line of a vision chart corresponding to the certain vision capability. As such, the user interface enables receipt of a size in height of  
20 the later projection and the certain vision capability. The number of picture elements per inch of the display screen, the height of the display screen, and the display type are queried from the operating system; or, in other embodiments, provided as input from the user.

25 Once a recommended font size is determined by the tool, the tool displays the recommended font size to the user. In one embodiment, the tool searches for any text that does not have at least the recommended font size and highlights, or otherwise identifies, the text for the user. The user can

then more easily find the text for editing; such as to change the font size to the recommended font size.

The system, method, and program of the invention further enables the presentation authoring program to

5 display the current font size to the user in a way that is representative of how a person would view the projected presentation at the expected viewing distance if the current font size in the presentation were utilized in a projected presentation. The tool utilizes the received input of an

10 expected viewing distance of the later projection having a given projection screen height, and redisplay the presentation data using a second font size on the display screen that is representative of an anticipated appearance of the later projected presentation by a person, having a

15 certain vision capability, at the expected viewing distance.

It should be noted that the present invention is applicable to bit mapped fonts and to scalable vector fonts. Likewise, "text" as used herein may be processed in the

20 computer as character data or as an image. As such, the presentation authoring tool of the present invention is also applicable to determining a minimum size of any image data in a presentation in a same fashion as described herein with reference to determining a minimum font size for text.

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#### BRIEF DESCRIPTION OF THE DRAWINGS

For a more complete understanding of the present

30 invention and the advantages thereof, reference should be

made to the following Detailed Description taken in connection with the accompanying drawings in which:

Fig. 1A is a block diagram of a computer system utilized in a preferred embodiment of the invention;

5 Fig. 1B illustrates a computer system connected to a projector for projecting a presentation onto a projection screen in accordance with a preferred embodiment of the invention;

10 Fig. 2A illustrates the dimensions of a room including the depth of the room, or maximum viewing distance, and the height of a projection screen in the room in accordance with a preferred embodiment of the invention;

15 Fig. 2B illustrates the size of a font used in a vision chart and the distance a person stands from the chart when determining the person's vision rating;

Fig. 2C illustrates the dimensions of a computer screen including the height of the screen and the height of a font displayed on the screen;

20 Fig. 3 illustrates a process flow diagram of a presentation authoring tool in accordance with a preferred embodiment of the invention;

Fig. 4 illustrates a user interface for a presentation authoring tool in accordance with a preferred embodiment of the invention;

25 Fig. 5A illustrates a sample presentation having a current given font size; and

Fig. 5B illustrates a preview provided by the presentation authoring tool in which the current given font size used in the presentation is reduced in size on the  
30 display screen of the computer to provide to the author a

relative indication as to the readability of the presentation when the presentation is projected onto a projection screen.

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## DETAILED DESCRIPTION OF THE PREFERRED EMBODIMENTS

10 In the following description, reference is made to the accompanying drawings which form a part hereof, and which illustrate several embodiments of the present invention. It is understood that other embodiments may be utilized and structural and operational changes may be made without departing from the scope of the present invention.

15 The present invention may be executed in a variety of systems, including a variety of computing systems and electronic devices under a number of different operating systems. In one embodiment of the present invention, the computing system is a portable computing system such as a  
20 notebook computer which can be easily moved to a room where a presentation is to be given and connected to a LCD projector. Other embodiments may utilize a desktop computer or workstation. In addition, the computing system may also be, for example, a network computer, a midrange computer, a  
25 server system, a mainframe computer, a palmtop computer, a personal digital assistant, a telephony device, or other electronic computing system. Therefore, in general, the present invention is preferably executed in a computer system that is capable of connecting directly, or via a

network, to a projector for projecting file content, such as a presentation, from the system to a projection screen.

Referring now to the drawings, and in particular to Fig. 1A, there is depicted one embodiment of a computer  
5 system with which the method, system, and program of the present invention may be advantageously utilized. Computer system 10 comprises a bus 22 or other communication device for communicating information within computer system 10, and at least one processing device such as processor 12, coupled  
10 to bus 22 for processing information. Bus 22 preferably includes low-latency and high-latency paths that are connected by bridges and controlled within computer system 10 by multiple bus controllers.

Processor 12 may be a general-purpose processor such  
15 as IBM's PowerPC™ processor that, during normal operation, processes data under the control of operating system and application software stored in a dynamic storage device such as a random access memory (RAM) 14 and a static storage device such as Read Only Memory (ROM) 16. The operating  
20 system preferably provides a graphical user interface (GUI) to the user. In a preferred embodiment, application software contains machine executable instructions that when executed on processor 12 carry out the operations depicted in the flowcharts described herein. More specifically, the  
25 application software is the presentation authoring tool having functional features in accordance with a preferred embodiment of the invention including the feature of determining a recommended font size for the presentation based upon characteristics of the room in which the  
30 presentation would be made. Alternatively, the steps of the

present invention might be performed by specific hardware components that contain hardwire logic for performing the steps, or by any combination of programmed computer components and custom hardware components.

5 Further, multiple peripheral components may be added to computer system 10. For example, a display 24 having screen 235 (Fig. 2C) is also attached to bus 22 for providing visual, tactile or other graphical representation formats to a user of the system such as an author using presentation  
10 authoring software. A projector 42, such as a LCD projector, is also attached to bus 22 for projecting content from a file onto a projection screen. Audio output through a speaker or other audio projection device may be controlled by audio output device 28 attached to bus 22. A keyboard 26  
15 and cursor control device 30, such as a mouse, track ball, or cursor direction keys, are coupled to bus 22 as interfaces for user inputs to computer system 10. It should be understood that keyboard 26 and cursor control device 30 are examples of multiple types of input devices that may be  
20 utilized in the present invention. In alternate embodiments of the present invention, additional input and output peripheral components may be added.

The present invention may be provided as a computer program product, included on a machine-readable medium  
25 having stored thereon the machine executable instructions used to program computer system 10 to perform a process according to the present invention. The term "machine-readable-medium" as used herein includes any medium that participates in providing instructions to processor 12  
30 or other components of computer system 10 for execution.



Such a medium may take many forms including, but not limited to, nonvolatile media, volatile media, and transmission media. Common forms of nonvolatile media include, for example, a floppy disk, a flexible disk, a hard disk,

5 magnetic tape or any other magnetic medium, a compact disc ROM (CD-ROM), a digital video disc-ROM (DVD-ROM) or any other optical medium, punch cards or any other physical medium, a programmable ROM (PROM), an erasable PROM (EPROM), electrically EPROM (EEPROM), a flash memory, any other  
10 memory chip or cartridge, or any other medium from which computer system 10 can read and which is suitable for storing instructions. In the present embodiment, an example of nonvolatile media is storage device 18. Volatile media includes dynamic memory such as RAM 14. Transmission media  
15 includes coaxial cables, copper wire or fiber optics, including the wires that comprise bus 22. Transmission media can also take the form of acoustic or light waves, such as those generated during radio wave or infrared data communications.

20 Moreover, the present invention may be downloaded as a computer program product, wherein the program instructions may be transferred from a remote computer such as server to requesting computer system 10 by way of data signals embodied in a carrier wave or other propagation medium via a  
25 network link (e.g., a modem or network connection) to a communications interface 32 coupled to bus 22. The signals through the various networks and the signals on the network link and through communications interface 32, which carry the digital or analog data to and from computer system 10,

are exemplary forms of carrier waves transporting the information.

Fig. 1B illustrates the computer system 10 as a laptop computer connected to an LCD projector 42. The computer 10 has a display screen 235. The presentation being authored by the presentation tool executing on the computer 10 is projected onto projection screen 212.

To determine a minimum desirable size of presentation text for a presentation projected by a presentation authoring tool, the system, method, and program of the invention utilizes information about the presentation environment such as room size, viewing distance, and projection screen size; characteristics of the presentation itself including display screen size; and other standard values with respect to vision measurements.

The following relationships are used in a preferred embodiment to determine the minimum desirable size of presentation text. The variables used in the relationships with respect to the presentation environment are shown in Fig. 2A as follows:

R1 = maximum viewing distance 210, which is typically the depth of the room;

Rh = height 211 of the presentation screen 212; and

Rf = height 213 of the font 214 on the presentation screen.

It should be noted that although the preferred embodiment of the invention utilizes maximum viewing distance or depth of the room, other embodiments could utilize an average viewing distance or an actual measurement

as to the placement of a last or given row of chairs in the audience. Depending on the distance of R1 that is utilized, the resulting determined font size may be an average or minimum recommended font size. It should also be noted that  
5 reference to the height 211 of the presentation screen 212, does not necessarily refer to a height of a physical screen, but rather of the height of the illuminated projection area created by the projector regardless of whether the projection is made on a physical screen or a wall.

10 The tool also utilizes some constants that are derived from a typical vision chart, as shown in Fig. 2B. Although 20/20 vision is considered perfect vision, not everyone has perfect vision. Even corrected vision may not be perfect. Therefore, a preferred embodiment of the tool utilizes 20/30  
15 as a reasonable threshold, although other embodiments may utilize other thresholds, including 20/20. Other constants from the typical use of eye charts, as shown in Fig. 2B, include:

20 C1 = distance 221 a subject stands from the eye chart 222; and

Cf = height 223 of the characters 224 on the 20/30 line.

25 The tool of the present invention also utilizes measurements from the computer screen itself on which the presentation tool is being run to present the presentation, as shown in Fig. 2C, including:

Sf = height 233 of the font 234 on the computer screen 235; and

Sh = height 231 of the computer screen 235.

5

The following formula is used to relate the room proportions to the computer screen proportions:

$$Rh/Sh = Rf/Sf$$

10

The following formula is used to relate the room proportion to the vision chart:

$$Rl/Cl = Rf/Cf$$

15

Combining the above two equations through the common variable

Rf, the equation becomes:

20

$$Sf*(Rh/Sh) = Cf*(Rl/Cl)$$

or

$$Sf*Rh*Cl = Cf*Rl*Sh$$

25

Solving for Sf which is the desired font size on the screen to enable a projection of presentation text that is viewable by others in a room having a given viewing distance, the equation becomes:

30

$$Sf = (Rl * Cf * Sh) / (Cl * Rh)$$

Once the font size on the screen is known in picture  
5 elements (pels or pixels), the presentation tool can derive  
the point size of the font, and recommend the derived point  
size to the user.

For example, if there are 100 pels per inch on a  
computer display screen, all of the necessary values can be  
10 converted accordingly as follows:

Rl = 100ft or 1200 inches or 120,000 pels

Rh = 10ft or 1000 inches or 100,000 pels

Sh = 768 pels

Cl = 10 feet or 120 inches or 12,000 pels

15 Cf = 1 inch (approx.), 100 pels

$Sf = (120,000 * 100 * 768) / (100 * 100,000)$

SF = 7.68 or about an 8 point font

20 Fig. 4A illustrates a user interface 401 for receiving  
user input for room depth or maximum viewing distance 410,  
projection screen height 411, computer screen height 412,  
picture elements per inch for the display screen 413 or  
display type 414, and desired vision ability 415. It should  
25 be noted that picture elements per inch 413 and display type  
414 and computer screen height 412 does not necessarily have  
to be included in the user interface for user input.  
Instead, the tool will query the operating system for these  
values. In yet another embodiment, they are included in the  
30 user interface if the user wants to provide input for these

values. If input is not provided, then the tool queries the operating system for the values. The user interface also allows the user to select whether the tool is to recommend a font size 421, or show a preview of the presentation using a known font size 422, as further described below.

Fig. 3 illustrates a process flow diagram of a preferred embodiment of the invention. The process begins when the presentation authoring program is executed and the font size determining feature is selected, 301. In response to the font size determining feature being selected 301, the presentation authoring software presents a user interface to the user for receiving certain input from the user including maximum distance from the projection screen or room depth, height of projection screen, and height of the computer display screen, 302. Other embodiments may also allow the user to specify whether the user wants the resulting size text to be visible to those having 20/20 vision at the maximum viewing distance, or to be clearly visible to those having 20/30 vision, or some other value at the maximum viewing distance. In a preferred embodiment, the default values used enable the resulting projected text to be clearly visible even to those that have no worse than 20/30 vision. Other embodiments may utilize other default values such that the resulting text is clearly visible to those that have no worse than 20/20 vision.

Once the user has input the requested values, the user selects a desired function for the tool to perform. The tool can calculate a recommended font size for the author to utilize when preparing the presentation text on the computer, or the tool can present the current font size to

the user in a way that is representative of how a person would view the projected presentation at a maximum viewing distance if the current font size is utilized in the projected presentation, 310.

5        If the user selects the tool to determine a recommended font size, the tool calculates a recommended font size for the text displayed on the author's display screen, 311. The tool uses the received input values of room depth or maximum viewing distance, the height of the projection screen, and  
10 the height of the author's computer display screen. The tool also uses some constant values such as the size of the font on a vision chart and the distance that a person would stand from the vision chart in order to see that sized font if the person had a certain vision as specified by a default  
15 value or as received as input, e.g., 20/20, 20/30, 20/40, etc., 313.

In performing the calculation, the presentation authoring program tool running on the author's computer system utilizes certain characteristics of the computer's  
20 display screen. This includes not only the screen height as inputted by the user, but also the number of picture elements (pels or pixels) per inch. The tool can get both of these values through input from the user. In another embodiment, one or more of these values are retrieved by the  
25 tool by querying the system for the type of display attached to the system. Knowing the display type, the tool can look up the number of picture elements per inch for that display type in a look up table in the tool. Once the tool knows the number of picture elements per inch on the computer  
30 display screen, the tool converts the calculated size of the

font above in inches to the closest point font. The tool displays the recommended font size to the user, 315.

The tool may also be used to highlight or otherwise identify specific text in a presentation that does not meet  
5 the recommended font size. As such, the presentation authoring tool scans the presentation for fonts smaller than the recommended size and warns the user, 317. The user is being warned, while the user is authoring the presentation, that text may be too small to be viewable when the  
10 presentation is projected onto a viewing screen of a given size and viewed by an audience a given distance from the projection screen.

Once the presentation authoring tool identifies the text, the user may then more easily edit the identified text  
15 thereby changing the identified text to at least the recommended font size. Likewise, upon a selection by the user, the tool may automatically resize any identified undersized text to at least the recommended font size.

The following describes the functions of the tool if  
20 the user selects the tool to display the current font size to the user in a way that is representative of how a person would view the projected presentation at a maximum viewing distance if the current font size is utilized in the presentation, 310, 312. The tool utilizes the relationship:

25

$$Sf * Rh * Cl = Cf * Rl * Sh$$



as described above to solve for a display screen height using the known font size Sf, 314, currently being used in the presentation text:

5        
$$Sh = (Sf * Rh * Cl) / (Cf * Rl)$$

If the font size that is used is actually smaller than the recommended size, the screen height Sh will be smaller, also.

10        To preview the screen and give the user an approximation of how the text, when projected, would appear to someone in the audience at the maximum viewing distance, the contents of the actual screen are reduced in size proportionally to fit in the newly calculated screen height,  
15 316. In the process of reducing the presentation down to the right proportional height, some information, such as the smaller details, may be lost although the larger objects and text may still be visible. If the actual font size is larger than the minimum recommended size, the tool will  
20 proportionally stretch the text and objects of the presentation displayed on the screen to make them larger.

Fig. 5A illustrates a sample presentation 501, using a current font size, which is displayed on computer display screen 502. Fig. 5B illustrates a preview of the  
25 presentation 510 having a smaller font size displayed on display screen 502. The contents of the actual screen 502 (Fig. 5A) are reduced in size proportionally to fit in the newly calculated screen height Sh, 520. This preview 510 illustrates to the user of the presentation authoring  
30 software tool how the presentation with the current font

size (as shown in Fig. 5A), within the authoring tool, would appear if the presentation were to be projected with a given screen projection height and viewed at a given maximum viewing distance.

5        It is intended that the scope of the invention be limited not by this detailed description, but rather by the claims appended hereto. The above specification, examples and data provide a complete description of the manufacture and use of the system, method, and article of manufacture,  
10 i.e., computer program product, of the invention. Since many embodiments of the invention can be made without departing from the spirit and scope of the invention, the invention resides in the claims hereinafter appended.

Having thus described the invention, what we claim as  
15 new and desire to secure by Letters Patent is set forth in the following claims.